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|-----------------|-------------|----------------------|---------------------|------------------|
| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/629,497      | 07/28/2003  | Scot Philip Sandoval | 97112.3300          | 6734             |

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EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

10/03/2007PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/629,497             | SANDOVAL ET AL.     |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Harry D. Wilkins, III  | 1753                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 September 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-7,9-17 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,9-17 and 28 is/are rejected.
- 7) ☒ Claim(s) 29 and 30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Rejection Status***

1. Applicant's amendment, clarifying that the present invention utilizes plate cathodes and flow-through anodes, has overcome the previous rejection grounds since Goens et al teaches using flow-through cathodes.

2. However, new grounds of rejection are presented below based on Tuwiner (US 2,792,342), which was cited by Applicant on the PTO-1449 filed 11 October 2005.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4-7, 9-17 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuwiner (US 2,792,342) in view of Sandoval et al (US 5,492,608).

Tuwiner teaches (see figures, and cols. 1-2) a process for electrowinning of copper that included the steps of providing an electrolytic cell (10) that included at least one flow-through anode (26, 26a) and at least one plate cathode (25), wherein the cathode has an active surface area, providing a flow of electrolyte to the electrolytic cell, wherein the electrolyte included copper and solubilized ferrous iron, oxidizing the ferrous iron to ferric iron at the flow-through anodes, reducing (removing) copper at the plate cathode, all by operating the electrolytic cell at a voltage in the range of 0.85-1.2 volts and cathode current density of 10-25 amperes per square foot.

The difference between the presently claimed method and the method of Tuwiner is that the present method requires a cathode current density of at least 26 amperes per square foot. Of import is that Tuwiner never discloses why the cathode current density was limited to 25 amperes per square foot.

Applicant discloses that the problem being addressed by the present application occurs (see paragraph 22) due to low rates of diffusion of ions at the anode, which limits the current density that can be applied.

However, Sandoval et al teach (see abstract, figures and the paragraph spanning cols. 8 and 9) that improvements in current densities can be achieved by increasing agitation of the electrolyte. Specifically, without agitation of the electrolyte, at higher current densities, rough, impure copper deposits were formed, but that by adding agitation, smooth copper deposits were formed. Also, Sandoval teach that increased current density results in increased cell productivity.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the circulation manifold system of Sandoval et al in the electrowinning method of Tuwiner, and to thereby increase the operating cathode current density above the 25 amperes per square foot limit taught by Tuwiner, because Sandoval teach that the circulation manifold system improved circulation and allowed higher current densities, which resulted in more productivity (i.e.-more copper in a less amount of time).

Regarding claims 4 and 5, the cell of Tuwiner operated at 0.85-1.2 volts.

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Regarding claims 6 and 7, Tuwiner gives an example of electrolyte flow rate of 1.30 gallons per minute (see col. 6) total (the cathodes were about 9 square feet per side each with three of them in the cell for  $9 \times 2 \times 3 = 54$  square feet total, or 0.02 gallons per minute per square foot of cathode surface area), however, in view of the teachings of Sandoval et al, one of ordinary skill in the art would have been led to increase the flow rate of the electrolyte to increase agitation of the electrolyte to permit higher current density and thereby greater productivity. Sandoval disclose examples where total cathode area was about  $43\frac{1}{3}$  square feet (2 plates, each 40" x 39", 2 sides to each plate) with flow rates of 3-11 gallons per minute total, for a resultant flow rate of 0.069-0.254 gallons per minute per square foot of cathode area.

Regarding claim 9, the flow-through anodes of Tuwiner were made of metallic mesh.

Regarding claims 10-11, Tuwiner discloses (see col. 6) total iron concentration of about 40 g/L.

Regarding claims 12-14, Tuwiner discloses (see col. 6) maintaining temperature of electrolyte entering the electrolytic cell at 161°F.

Regarding claims 15-17, Tuwiner does not teach a recycling of electrolyte wherein at least a portion of the ferric ions are reduced back to ferrous ions to form a regenerated electrolyte.

Sandoval et al teach (see col. 7, lines 27-37) recycling a copper electrowinning electrolyte through activated carbon modules and exposing the electrolyte to sulfur

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dioxide gas to reduce the ferric ions back to ferrous ions to form a regenerated electrolyte which is fed back to the cell.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the recycle line taught by Sandoval et al in the method of Tuwiner in order to effectively recycle the electrolyte to reduce waste. The activated carbon acts as a catalyst in the process.

Regarding claim 28, Sandoval et al disclose using an electrolyte injection system which included multiple injection holes.

#### ***Allowable Subject Matter***

5. Claims 29 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: With respect to claim 29, Sandoval et al teach the importance (see paragraph spanning cols. 6 and 7) of maintaining the injection area within the "middle" area of the cell with respect to the vertical direction. Thus, Sandoval et al teach away from placing the injection device at either the floor or ceiling of the electrolytic cell. With respect to claim 30, the prior art doesn't teach or suggest using injection devices located within the flow-through anodes.

#### ***Response to Arguments***

7. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

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***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

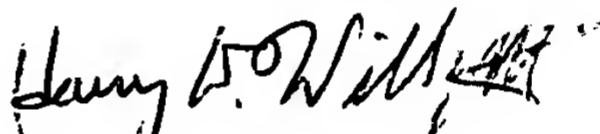
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 7:45am-4:15pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Harry D Wilkins, III  
Primary Examiner  
Art Unit 1753

hdw